

REVISION OF *HOCKERIA* WALKER IN THE NEARCTIC REGION  
WITH DESCRIPTIONS OF MALES AND FIVE NEW SPECIES  
(HYMENOPTERA: CHALCIDIDAE)

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*Abstract.*—The genus *Hockeria* Walker is revised for the Nearctic region. Nine species are recognized; five new species (*hainesi*, *bicolor*, *brevipennis*, *micra*, and *burksi*) are described. Four previously described species, *eriensis* (Wallace), *rubra* (Ashmead), *temnicornis* (Girault), and *unipunctatipennis* (Girault), are diagnosed and discussed. Males of all species are described and allotypes or plesiotypes designated. *Hockeria americensis* (Girault) is designated a junior synonym of *H. unipunctatipennis*. A key to the Nearctic species for both males and females is presented. Characters of females and males are illustrated. Biological and distributional information is summarized for each species. *Hockeria eriensis* and *H. bicolor* n.sp. are recorded from the Neotropical region.

*Key Words:* Insecta, *Hockeria*, Chalcididae, revision, new species, Nearctic

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The worldwide genus *Hockeria* Walker contains about thirty described species. Walker described *Hockeria* in 1834 with *H. bispinosa* Fabricius, a European species (synonym of *H. bifasciata* Walker), as the nominal type-species. Major faunal treatments of *Hockeria* include: Japan (Habu 1960, 1962), Europe (Boucek 1951), USSR (Nikolskaya 1952, 1960), the Near East and India (Husain and Agarwal 1982). Husain and Agarwal (1982) presented a key to the world species of *Hockeria* but none of the Nearctic species were included. The Nearctic *Hockeria* are revised herein for the first time. No taxonomic keys or comprehensive treatments exist for this fauna. The fauna contains nine species, five of which are newly described in this paper. Past literature on Nearctic *Hockeria* is cataloged in Peck (1963), Burks (1979), and DeSantis (1979).

*Hockeria* are small to moderate sized wasps (2 to 10 mm). Females have slender filiform antennae and are entirely black, red

or orange, or commonly with a combination of red or orange and black. Males have robust filiform antennae, are usually black with some orange markings, and are more robust than females. The forewing of females is clouded in a specific pattern whereas in males it is usually clear.

At present, a generic revision of the American Chalcididae is underway (Boucek, pers. comm.); therefore, a generic description of *Hockeria* is omitted. However, to facilitate the identification of this genus for the Nearctic region the following characters are diagnostic: vertex not produced into horns, hindtibiae truncate distally, two apical hindtibial spurs present (Haltichellinae); marginal vein on anterior margin of forewing, postmarginal and stigmal veins present (Haltichellini); tergite 1 without carinae; posterior margin of scutellum without a median tooth; frontal carina weak, not joining in ocellar area to form an arch.

Useful species characters for females in-

clude: clouded pattern of the forewing; color; shape of the abdomen, hindfemora, head, antennae, and ovipositor sheath; sculpture of tergite 1 and mesopleural acetabulum; length of flagellomeres; body length; and body sculpture. Characters for males include: body length and color; T1 sculpture; forewing clouding and color; shape of the scutellum (especially the shape of teeth on the posterior margin or their absence), flagellomeres, and propodeal carinae.

The taxonomy of the Nearctic *Hockeria* has been based on females, and only the male of *H. eriensis* (Wallace) has been described. Strong sexual dimorphism and dichromatism makes the male-female associations difficult. Males usually have a robust body, robust filiform antennae, clear wings, and black body coloration; whereas, females usually have a more slender body, slender filiform antennae, clouded wings, and red-orange and black body coloration. Species exhibiting strong sexual dimorphism and dichromatism include: *eriensis*, *rubra* (Ashmead), *temicornis* (Girault), *unipunctatipennis* (Girault), and *hainesi* n. sp. The species *micra* n. sp., *burksi* n. sp., *bicolor* n. sp., and *brevipennis* n. sp. are less dichromatic. Males are similar morphologically, which complicates the task of distinguishing them and making the proper female association. However, examination of large series has permitted the male-female association for all species. These males are described and specimens designated as allotypes or plesiotypes.

The nine Nearctic species will not be classified into species groups at this time. I think a world overview is necessary to determine and designate species groups. However, two species (*H. eriensis* and *H. bicolor* n. sp.) form a unique group separate from other Nearctic species in having a narrow head, globose abdomen, and strongly arched scutellum. Boucek (1951) also noted short, stout forms and slim forms in the European fauna.

World literature denotes a wide range of

hosts for *Hockeria*: antlion larvae (Neuroptera), elasmid and tenthredinid pupae (Hymenoptera), free-living Strepsiptera, dipteran pupae, and commonly lepidopteran larvae and pupae (Boucek 1951, Habu 1962, Burks 1979, Narendran and Rao 1987). Hosts have been determined for six of the nine Nearctic species, including three economically important lepidopterous pests: the Western Grapeleaf Skeletonizer (*Harrisina brillians* Barnes and McDunnough), the Nantucket Pine Tip Moth (*Rhyacionia frustrana* (Comstock)), and the Ponderosa Pine Tip Moth (*Rhyacionia zozana* (Kearfott)) and a new host record of ascalaphid larvae (Neuroptera).

*Hockeria* is widely distributed throughout the Nearctic region (Fig. 53). The distribution map is based upon specimens examined by the author, and it encompasses most of the literature records. *Hockeria* are found in a variety of habitats and elevations. In California, some species (e.g. *eriensis* and *rubra*) range from coniferous forests to deserts. Several species range throughout the entire Nearctic region. A few species are known only from the western United States although additional collecting will likely extend their range. No species are restricted to the eastern United States or Mexico and interestingly, all Nearctic species have been collected in California. It is possible that the Nearctic species may also occur in the Palearctic or Neotropical regions; however, this awaits further study. Despite their broad range, *Hockeria* are rarely collected and uncommon in collections. Sweeping flowering vegetation or vegetation in general, and using Malaise-type traps and pan-traps are successful collecting techniques.

Many *Hockeria* specimens, representing seven species, were collected from a hydroelectric flume which runs through Foothill Woodland and Chamise Chaparral plant communities 660 m (2200 ft) in Tulare County, California. Large series of undescribed, rarely collected, and/or poorly represented species were collected from this

source (Halstead and Haines 1987). Without these specimens, species variation, male/female associations, and complete distributions would have been difficult to determine. During this study, somewhere between 1000 to 2000 specimens of *Hockeria* were examined.

Collections examined and museum acronyms are as follows: American Museum of Natural History, New York; Bernice P. Bishop Museum, Hawaii; California Academy of Sciences, San Francisco (CAS); California Department of Food and Agriculture, Sacramento (CDFA); California State University, Fresno; California State University, Sacramento; Canadian National Collection, Ottawa (CNC); Carnegie Museum of Natural History, Pittsburg, Pennsylvania (CMNH); Florida Department of Agriculture and Consumer Affairs, Gainesville (FDA); Fresno County Department of Agriculture Fresno, California; Illinois Natural History Survey, Champaign; Los Angeles County Museum of Natural History, California (LCM); Mississippi State University, Mississippi State; Natural History Museum of San Diego, California; Oregon Department of Agriculture, Salem; Royal Ontario Museum, Toronto (ROM); Texas A&M University, College Station; Tulare County Agricultural Commissioner's Office, Visalia, California; United States National Museum of Natural History, Washington D.C. (USNM); University of California, Berkeley; University of California, Davis; University of California, Riverside (UCR); University of Georgia, Athens (UOG); J. A. Halstead personal collection (JAH); H. A. Hespenheide personal collection, Los Angeles, California (HAH); R. B. Miller personal collection, Project City, California (RBM); R. D. Haines personal collection, Visalia, California (RDH).

Abbreviations include: T1 for tergite 1, etc.; OOL (ocular-ocellar line) for the smallest distance between the compound eye and lateral ocelli; OL (ocellar line) for the small-

est distance between the anterior ocellus and lateral ocelli; LOD for lateral ocellar diameter; AOD for anterior ocellar diameter. All measurements were made in the flattest plane possible. Specimens were examined at 30 to 100×. A mylar, glare reducing screen was used in lighting specimens.

KEY TO NEARCTIC SPECIES OF *HOCKERIA*

- 1. Females; ovipositor present (Figs. 1–10) . . . . . 2
- Males; ovipositor absent . . . . . 10
- 2. Gaster (lateral view) about 1½× as long as wide, apex rounded (Figs. 8–10) . . . . . 3
- Gaster (lateral view) 2–3× as long as wide, apex pointed (Figs. 1–7) . . . . . 4
- 3. Hindfemur about 3× as long as wide, without ventral projections (Fig. 40, rarely as in Fig. 38); T1 punctate dorsally, with coriaceous band posteriorly . . . . . *enensis* (Wallace)
- Hindfemur about 2× as long as wide, with an anterior toothlike projection and a rounded posterior projection (Fig. 39); T1 coriaceous . . . . . *bicolor* Halstead n. sp.
- 4. T1 punctate dorsally; forewing with a single clouded area under marginal vein (Figs. 45–46), rarely with no or 2 clouded areas; body black . . . . . 5
- T1 polished or slightly coriaceous dorsally; forewing with two clouded areas (Figs. 41–44) or a clear circular area laying within a large clouded area (Fig. 47); body partly or entirely red or orange . . . . . 6
- 5. Apex of ovipositor sheath with dorsal margin evenly rounded (lateral view) (Fig. 6); length about 3.8 mm . . . . . *burksi* Halstead n. sp.
- Apex of ovipositor sheath with dorsal margin angled (Fig. 5); length about 2.5 mm . . . . . *micra* Halstead n. sp.
- 6. Forewing with a clear circular area containing a dense patch of white setae, enclosed within a brown clouded area (Fig. 47) . . . . . *unipunctatipennis* (Girault)
- Forewing without a clear circular area (Figs. 41–44) . . . . . 7
- 7. Length less than 3 mm (2.5 to 2.8 mm) . . . . . 8
- Length greater than 4 mm (4 to 10 mm) . . . . . 9
- 8. Apex of ovipositor sheath with dorsal margin evenly rounded (lateral view) (Fig. 3); head, thorax, propodeum, and legs partly black . . . . . *hainesi* Halstead n. sp.
- Apex of ovipositor sheath with dorsal margin squared (Fig. 4); head, thorax, propodeum and legs orange . . . . . *brevipennis* Halstead n. sp.
- 9. Apex of ovipositor sheath with dorsal margin



- evenly rounded (Fig. 2); head, thorax, propodeum, and legs partly black ..... *tenuicornis* (Girault)
- Apex of ovipositor sheath with dorsal margin angled (squared) (Fig. 1); head, thorax, propodeum and legs red to orange ..... *rubra* (Ashmead)
10. T1 punctate dorsally, posterior margin with a thin coriaceous band ..... 11
- T1 coriaceous dorsally or if punctate, punctures extending  $\frac{2}{3}$  or less the length of T1; posterior margin with a broad coriaceous band. Or, if scutellum is strongly arched (Fig. 51) go to couplet 12 ..... 15
11. Wings darkly clouded throughout, commonly with an orangish tint; scape, tegulae, and legs usually orange; head (lateral view) oval and interantennal projection large (Fig. 27) ..... *unipunctatipennis* (Girault)
- Wings clear or with a small clouded spot; body color mostly black; head (lateral view) oblong and/or interantennal projection small (Figs. 25, 26, 30) ..... 12
12. Scutellum strongly arched dorsally (Fig. 51); forewing with apical  $\frac{2}{3}$  clouded and a prominent brown spot under marginal vein ..... *eriensis* (Wallace)
- Scutellum slightly convex; forewing clear or with a faint clouded spot under marginal vein ..... 13
13. Flagellomeres 2 to  $2\frac{1}{2}\times$  as long as wide; mesopleural acetabulum with sculpture between strong transverse carinae polished ..... *burksi* Halstead n. sp.
- Flagellomeres 3–8 1 to  $1\frac{1}{2}\times$  as long as wide; mesopleural acetabulum with sculpture between weak transverse carinae punctate ..... 14
14. Propodeum with a strong longitudinal, submedian carina; anterior area of mesopleuron punctate and rugose ..... *hainesi* Halstead n. sp.
- Propodeum with an oval reticulation of carinae medially; mesopleuron anteriorly smooth and polished, punctate only ventrally ..... *micra* Halstead n. sp.
15. T1 coriaceous dorsally; tergites without oval macropunctures; body partly or entirely orange to red-brown ..... 16
- T1 punctate dorsally, sometimes punctures shallow and faint, appearing somewhat polished—if so, tergites with oval macropunctures (Fig. 52); body black ..... 17
16. Scutellum with two, wide, triangular teeth at posterior margin, sculpture coriaceous centrally; head and thorax with well defined, moderately deep punctures which are separated by  $\frac{1}{2}$  to  $\frac{1}{3}$  their diameter, sculpture aciculate, polished; body orange to red and black ..... *bicolor* Halstead n. sp.
- Scutellum rounded at posterior margin, sculpture matte; head and thorax with shallow, vague punctures which are separated by  $\frac{1}{2}$  to  $\frac{1}{3}$  their diameter, sculpture smooth, matte; body orange-brown ..... *brevipennis* Halstead n. sp.
17. Posterior margin of scutellum with two triangular teeth; T1 dorsolaterally with macropunctures; band of macropunctures on other tergites prominent (Fig. 52) ..... *rubra* (Ashmead)
- Posterior margin of scutellum rounded to truncate; T1 dorsolaterally without macropunctures, macropunctures on other tergites absent or faint and shallow ..... *tenuicornis* (Girault)

### *Hockeria eriensis* (Wallace)

Figs. 8, 10, 18, 20, 28, 30, 38,  
40, 48, 50, 51, 53

*Stomatoceras rubra* var. *eriensis* Wallace, 1942: 31, ♀ & ♂.

*Stomatoceras rubrum eriense* Wallace; Peck 1951: 585.

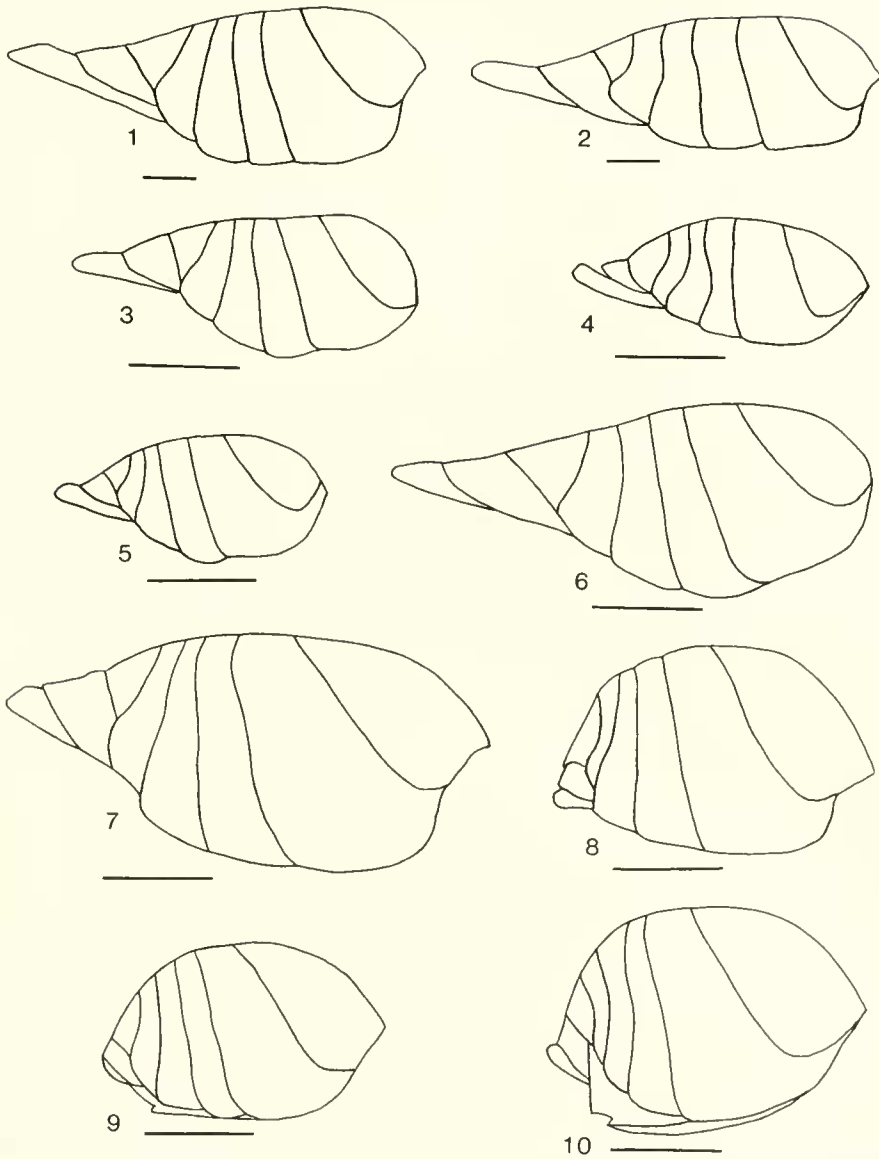
*Hockeria eriensis* (Wallace); Burks, in Stefan 1959: 304.

Female diagnosis (species).—Length about 5.0 mm. Red or orange with teeth of mandibles, mesosternum, anterior margin of mesoscutum, metanotum laterally, flagellomere 4 or 5 to apex, and teeth on ventral margin of hindfemur black.

Head as in Fig. 30. Antennae (Fig. 20) geniculate. Scutellum (Fig. 51) strongly arched. Forewing (Figs. 48, 50) with one or two clouded areas; at apex of marginal vein and in middle of wing near apex. Hindfemur (Fig. 40) narrow, elongate, without prominent ventral projections. Abdomen (Fig. 10) globose, apex blunt.

The female of *Hockeria eriensis* is most similar to *H. bicolor* n. sp. though is distinguished by its hindfemur shape. These two species (females) differ from other Nearctic *Hockeria* by having a narrow head, globose abdomen, and strongly arched scutellum.

Variation (♀).—Length 2.5 to 5.0 mm. Most specimens are orange, or red with black areas. Wallace (1942) noted "dark females in which the head and thorax are almost entirely black, and the abdomen heavily

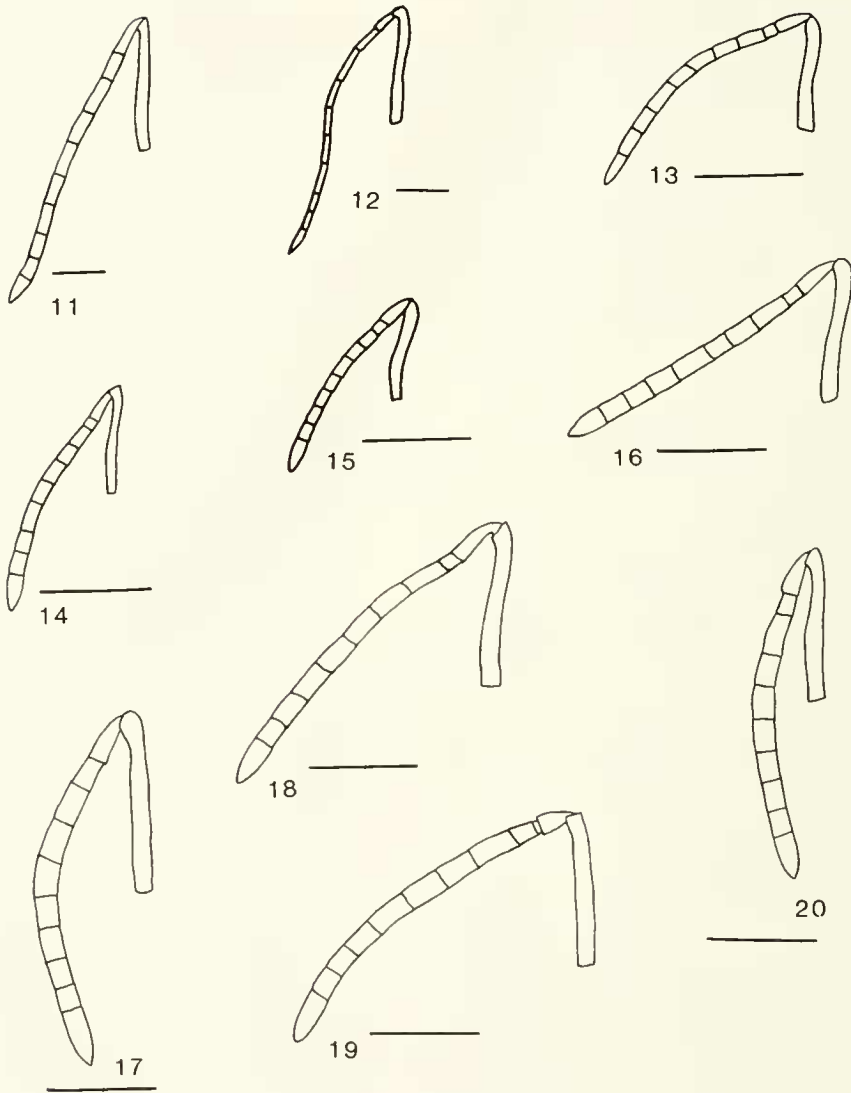


Figs. 1–10. *Hockeria* spp., abdomens of females (lateral view). 1, *rubra*. 2, *tenuicornis*. 3, *hainesi* n. sp. 4, *brevipennis* n. sp. 5, *micra* n. sp. 6, *burksi* n. sp. 7, *unipunctatipennis*. 8, *ericensis*, variation. 9, *bicolor* n. sp. 10, *ericensis*. Note differences in the overall shape and the shape of the ovipositor sheath. Scale lines 1.0 mm.

suffused with black.” I have examined only a few dark colored specimens from the United States and the Dominican Republic. Forewing clouding varies from a single light colored spot to two dark spots. Forewing clouding of Dominican Republic specimens is unusually dark. Body morphology varies,

including shape of antennae (Figs. 18, 20), head (Figs. 28, 30), abdomen (Figs. 8, 10), and hindfemora (Figs. 38, 40).

Male diagnosis (species).—Length about 4.9 mm. Black with tarsi and apices of tibiae orange. The strongly arched scutellum, two triangular teeth at its posterior margin, and



Figs. 11-20. *Hockeria* spp., antennae of females (lateral view). 11, *rubra*. 12, *tenuicornis*. 13, *harnesi* n. sp. 14, *brevipennis* n. sp. 15, *micra* n. sp. 16, *burksi* n. sp. 17, *unipunctatipennis*. 18, *eriensis*, variation. 19, *bicolor* n. sp. 20, *eriensis*. Note differences in the shape of the scape, pedicel, and flagellomeres. Scale lines 1.0 mm.

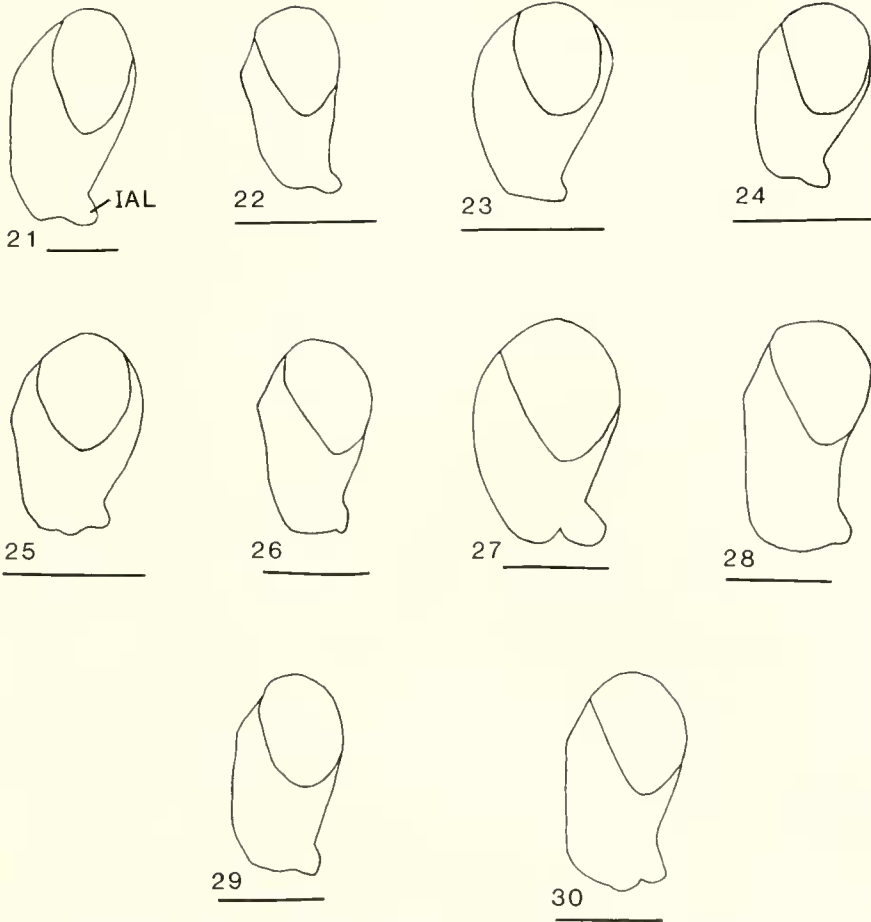
other characters presented in the key are distinguishing. This is the only previously described male in the Nearctic region.

Variation ( $\delta$ ).—Length 3.0 to 5.0 mm. The integument of T1 varies somewhat as indicated in the key. Scape and flagellum rarely red. Forewing clouding varies as in the female. Dominican Republic specimens with scape and legs (except trochanters) red-

brown, and the two clouded areas of forewing dark.

Type material.—Paratypes in USNM examined. Holotype female and allotype male in CMNH. Type locality: Pennsylvania, Erie, Presque Isle. Paratypes in USNM and CMNH.

New distribution records.—MEXICO: Baja California Sur and Norte, Sonora, Mi-



Figs. 21–30. *Hockeria* spp., heads of females (lateral view). 21, *rubra*. 22, *temuicornis*. 23, *hainesi* n. sp. 24, *brevipennis* n. sp. 25, *micra* n. sp. 26, *burksi* n. sp. 27, *unpunctatipennis*. 28, *eriensis*, variation. 29, *bicolor* n. sp. 30, *eriensis*. Note differences in the overall shape, size of the interantennal lobe (IAL), and slope of the face. Scale lines 1.0 mm.

choacan, Puebla, Oaxaca; VENEZUELA: Bolivar, Guarico, Aragua; GUATEMALA: Zacapa; DOMINICAN REPUBLIC: Pedernales, Independencia, Monte Cristi, and La Altagracia.

Flight period.—March to September.

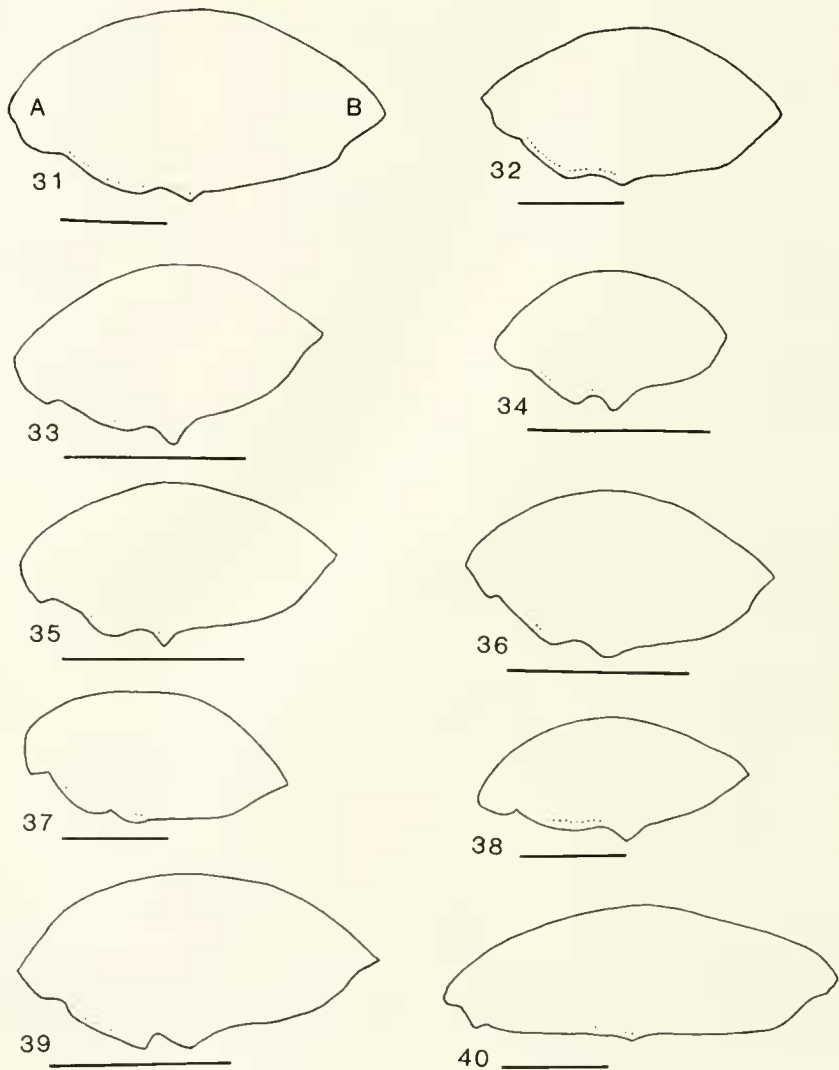
Host.—*Myrmeleon* sp., *Myrmeleon immaculatus* DeGeer, *M. exitialis* Walker (2nd instar), *M. arizonicus* Banks, *Eremoleon* n.sp. in caves (Neuroptera: Myrmeleontidae).

Biology.—Wallace (1942) presented detailed information on the life history. *Hock-*

*eria eriensis* oviposits into and develops as an internal parasitoid of antlion larvae. The adult wasp emerges from the round, sand-covered antlion cocoon.

Floral records.—*Cleome serrulata* Pursh., *Gossypium hirsutum* L., *Larrea divaricata* Cav., *Baccharis*, *Croton*, and *Eriogonum*.

Comments.—The hindfemur of typical females (Fig. 40) is unlike that of any other Nearctic *Hockeria*. The structure may be related to its ovipositional behavior and host's defenses. Several chalcidids parasitize antlions (Steffan, 1959), and the shape



Figs. 31–40. *Hockeria* spp., hindfemora of females (lateral view), stippling denotes area with teeth along ventral margin. Base (B) of femur to right, apex (A) to left. 31, *rubra*. 32, *tenuicornis*. 33, *hainesi* n. sp. 34, *brevipennis* n. sp. 35, *micra* n. sp. 36, *burksi* n. sp. 37, *unipunctatipennis*. 38, *eriensis*, variation. 39, *bicolor* n. sp. 40, *eriensis*. Note differences in the overall shape, and the location and size of the ventral projections. Scale lines 1.0 mm.

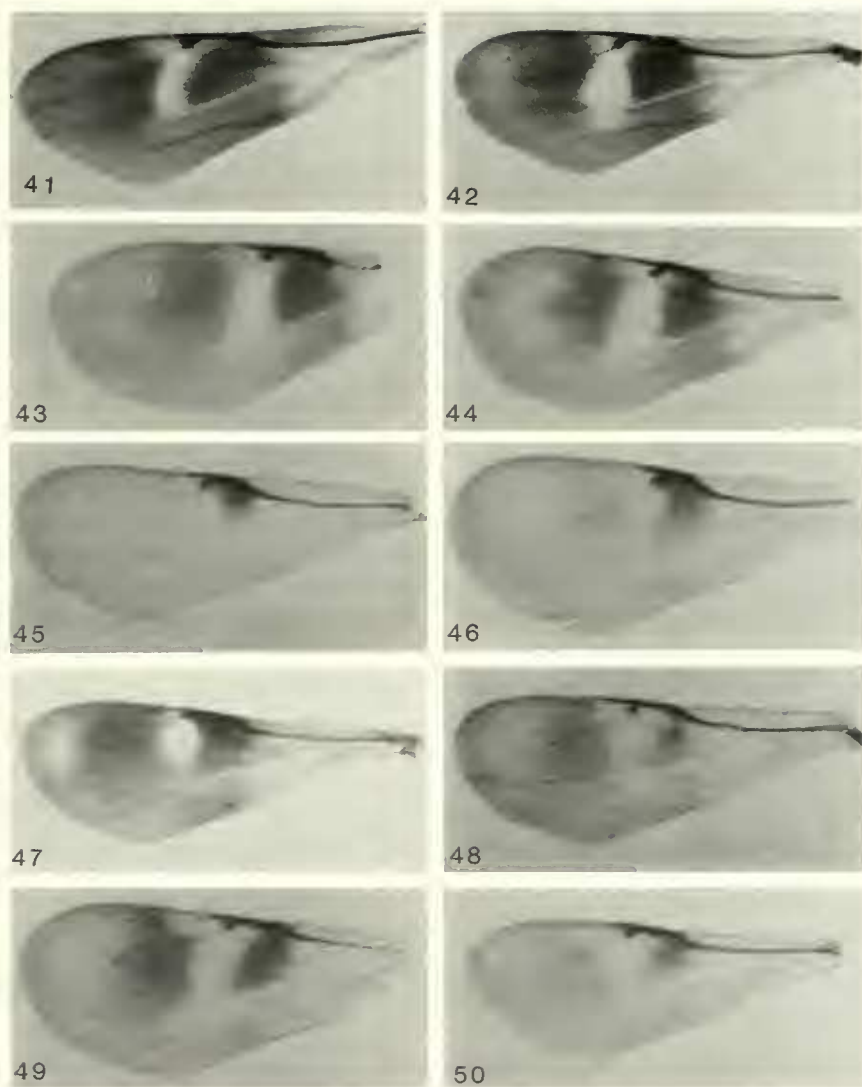
of the hindfemur among these species is variable.

***Hockeria bicolor* Halstead,  
NEW SPECIES**

Holotype female.—Length 3.1 mm. Black with scape, pedicel, annellus, interantennal lobe, flagellomeres 1, 2, clypeus, labrum, mandibles (except teeth), tegulae, submar-

ginal vein of forewing, venation of hindwing, legs (except tarsal claws and teeth on ventral margin of hindfemur), ovipositor sheath (except apically), tergites ventrally, T1 along dorsoposterior margin, epipygidium, hypopygidium, and sternites orange; labial and maxillary palps, labium, remainder of venation, ventroposterior area of mesopleuron, small area on metapleuron an-





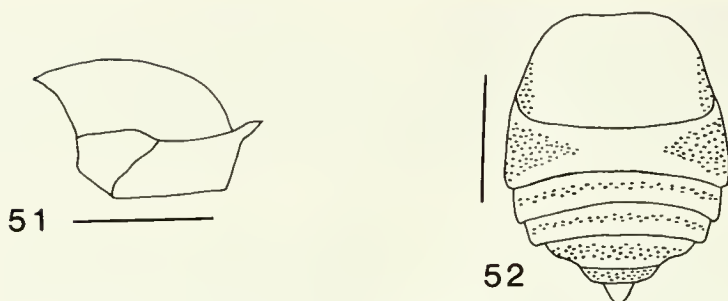
Figs. 41–50. *Hockeria* spp., forewings of females. 41, *rubra*. 42, *tenuicornis*. 43, *hanesi* n. sp. 44, *brevipennis* n. sp. 45, *micra* n. sp. 46, *burksi* n. sp. 47, *unipunctatipennis*. 48, *eriensis*, variation. 49, *bicolor* n. sp. 50, *eriensis*. Note differences in the number of clouded areas and the shape of hyaline areas.

terior to base of hindcoxae, and petiole orange-brown. Setae and pubescence silver.

Head (Fig. 29) narrow (lateral and dorsal view), polished, with umbilicate setigerous punctures; OOL < LO, OL = LO; antennae (Fig. 19) geniculate; interantennal lobe large; frons with anterior margin (lateral view) vertical; scrobe cavity slightly depressed, with strong transverse carinae, coriaceous;

gena with shallow punctures; innerorbital ridge absent.

Thorax sculptured like head, integument aciculate; scutellum strongly arched, aciculation radiating from center, posterior margin with 2 small teeth; mesopleural acetabulum slightly depressed, transversely carinate, rugose; hindfemur (Fig. 39) ovoid, about 2× as long as high, ventral margin



Figs. 51, 52. 51, Scutellum, *Hockeria ertensis* male, lateral view. 52, Abdomen, *H. rubra* male, dorsal view; stippling denotes macropunctures. Scale lines 1.0 mm.

with 2 projections and 23 small teeth; forewing (Fig. 49) reaching to apex of abdomen, with 2 clouded areas; hindwing clear.

Gaster (Fig. 9) equal in length to thorax, ovoid, dorsal margin convex (lateral view), apex blunt; T1 about  $\frac{1}{2}$  length of gaster, coriaceous (except for basolateral polished area); T2–6 finely coriaceous; T3–5 with a faint transverse line of shallow punctures, punctures on T6 pronounced and distributed throughout; T1–2 asetose (except for dorsolaterally), remainder of abdomen lightly setose; ovipositor not projecting posterior of abdomen.

Variation (♀).—Length 3.1 to 3.4 mm. Paratype from Florida with hindfemora brown. Paratypes from Trinidad and Brazil with tibiae (except apex), femora, tegulae, and abdomen brown to black.

Allotype male.—Length 3.3 mm. Black with scape, pedicel, labrum, clypeus, mandibles, trochanters, tibiae, and tarsi orange; coxae, femora, tegulae, and tergites ventrally orange-brown.

Head  $1\frac{2}{3}$  × as high as wide (lateral view),  $2\frac{1}{2}$  × as wide as long (dorsal view), triangular (frontal view), with setigerous umbilicate punctures, polished; scrobe cavity very shallow, almost flat, microridged and coriaceous; antennae geniculate, flagellum filiform; scape reaching dorsal margin of scrobe cavity, separated from anterior ocellus by AOD, coriaceous and setose (except for anterior margin); pedicel as wide as long, con-

ical; flagellomere 1  $2\frac{1}{2}$  × as long as wide, others 2 × as long as wide; flagellum covered with dense, silver pilose; OOL  $\frac{1}{2}$  LOD, OL  $1\frac{1}{4}$  × AOD.

Thorax with shallow, widely spaced setigerous umbilicate punctures (separated by  $\frac{1}{3}$  to 1 × their diameter), integument aciculate, prominent on pronotum and axillae; mesopleural acetabulum shallowly concave, integument transversely carinate and coriaceous; scutellum moderately convex, posterior margin with two wide, triangular teeth; hindfemur oval, 2 × as long as high, a projection on ventral margin near middle, small teeth on ventral margin from projection to apex; legs coriaceous and setose; wings clear, with dark setae; postmarginal vein  $\frac{1}{2}$  × marginal vein.

Gaster oval, slightly less than length of thorax; tergites densely coriaceous (except for polished band on anterior margin of T2–4); indications of faint transverse line of punctures on T3–6; T1 basolaterally with a patch of setae; T2–6 setose (except medially).

Variation (♂).—Length 3.2 to 3.5 mm. Two males (nontype) from Florida with hindfemora brown.

Type material.—Holotype ♀ (CAS No. 15241), U.S.A., CALIFORNIA, Tulare Co., Ash Mtn., Kaweah powerhouse #3, VIII-15-1982, from hydroelectric flume, R. D. Haines, D. J. Burdick, J. A. Halstead. Allotype ♂ (CAS No. 15241a). MISSOURI,

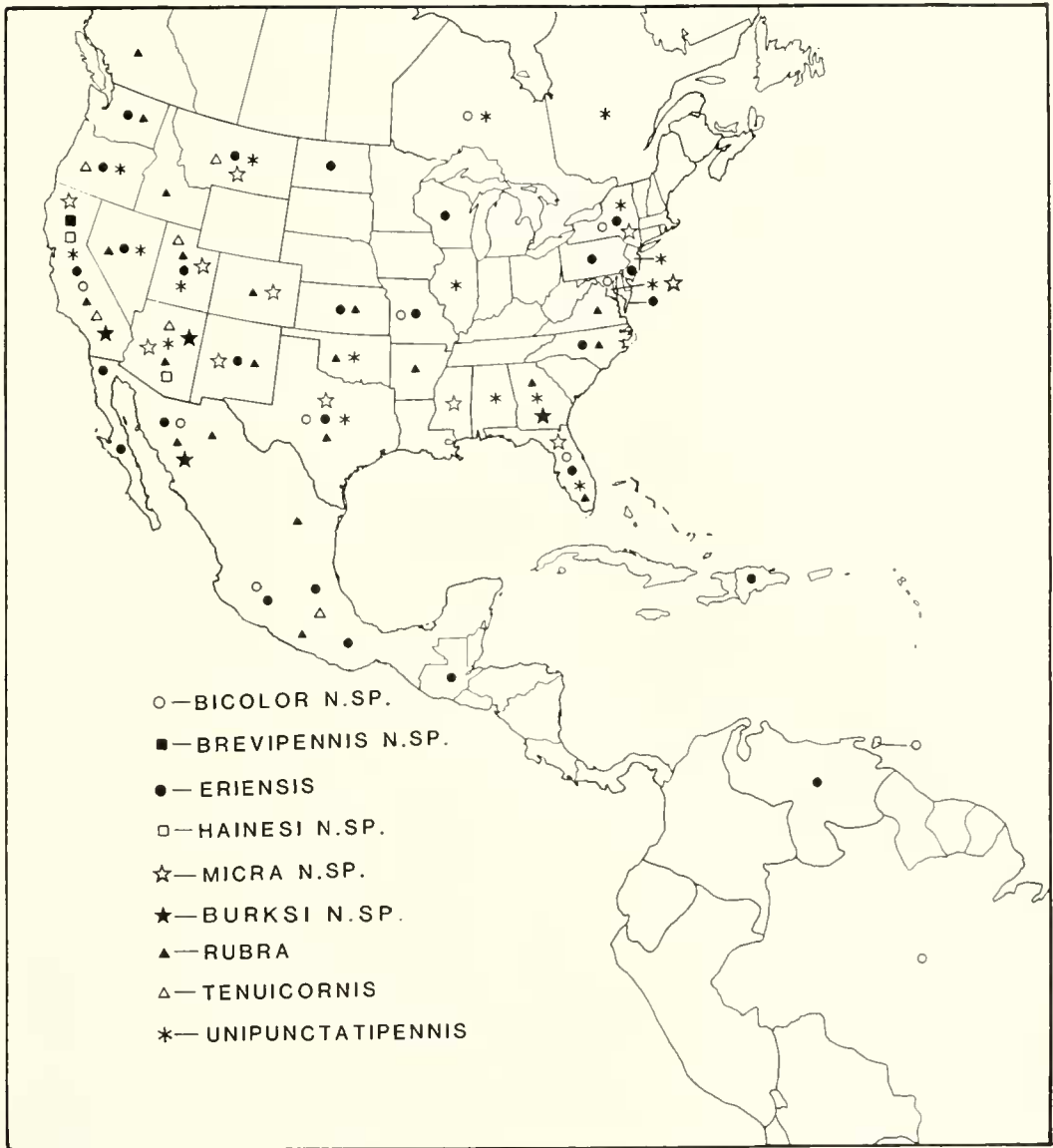


Fig. 53. Distribution of Nearctic species of *Hockeria*. The range of a couple species includes the Neotropical region. A symbol in a state, province, or country indicates the species is widely distributed in that region.

Boone Co., Columbia, V-16-31-1968, Malaise trap, F. D. Parker. Paratypes: CANADA, ONTARIO, 1♀, Lambton Co., Pinery Prov. Park, Riverside Cprnd., dry ground, open oak woodland, VII-1-1979, #770100, W. Maddison (ROM). U.S.A., CALIFORNIA, 15 ♀ with same data as holotype but collected VIII-27, 31-1982, VII-7, 17, IX-8, 18-1983, VI-23-1985, VI-VIII-1986

(CAS, USNM, JAH, RDH); 4 ♀, Madera Co., Bass Lake, VII-7-1986, R. D. Haines (RDH). TEXAS, 1 ♀, Uvalde Co., Uvalde, Speir Rch. 0.3 mi NW., V-7-1977, Malaise trap 9a-5p, T. Eichlin, M. Wasbauer (CDFA). MISSOURI, 2 ♀, Boone Co., Columbia, VII-16-31, VIII-16-1968, Malaise trap, F. D. Parker (USNM). MARYLAND, 14 ♀, Worc. Co., Shad Landing S. P., col.

IX-26-1986, em. XI-3-1986, G. L. Williams, ex. *Ululodes quadrimaculata* larvae in pupal cell (USNM). FLORIDA, 2 ♀, Alachua Co., Gainesville, S9-T10S-R18E, IV-16-1976, Malaise trap, W. H. Pierce (UCD). 1 ♀, Okaloosa Co., 4.5 mi N. Holt, Fla. A&M Res. Sta., Blackwater River State Forest, VI-17-1978, L. A. Stange (FDA). MEXICO, SONORA, 2 ♀, 7 mi S. Alamos, III-20-1985, R. B. Miller and L. Stange, 8 wasps emerged from one *Guttipes* group *Psammoleon* cocoon (RBM, CAS). JALISCO, 1 ♀, Puerto Vallarta, XII-5-10-1985, G. E. Bohart (USU). WEST INDIES, TRINIDAD, 2 ♀, Curepe Sta., Margarita, Circular Rd., I-28-II-9-1974, E. D. Bennett (CNC); 1 ♀, Tucker Valley I-20-26-1974, M. J. Sommeijer (CNC). BRAZIL, CAMPINAS, 1 ♀. Sp., Faz. Campininas, Mogi Guacu, I-1-8-1970, J. M. and B. A. Campbell (CNC).

Nontype material.—TEXAS, 2 ♂, as above. NEW YORK, 2 ♂, (AMNH). FLORIDA, 1 ♂, Marion Co., Ocala Natl. Forest, vic. Hopkins Prairie, V-11-18-1979, G. B. Fairchild, insect flight trap (FDA); 1 ♂, Monroe Co., Fleming Key, VII-16-1979, J. A. Acree and H. V. Weems, Jr., insect flight trap (FDA); 1 ♂, Highlands Co., Archbold Biol. Sta., IV-16-18-1982, L. L. Lampert, Malaise trap (FDA). MEXICO, SONORA, 2 ♂, as above.

Host.—*Psammoleon* sp. (Neuroptera: Myrmeleontidae); *Ululodes quadrimaculata* (Say) (Neuroptera: Ascalaphidae).

Comments.—The female of this species is most similar to *H. eriensis*. The characters in the key easily distinguish these two species. Refer to the *eriensis* female diagnosis section for additional comments.

Etymology.—The specific name, a Latin compound word, means two colors—referring to the red and black body coloration.

***Hockeria unipunctatipennis* (Girault)**

Figs. 7, 17, 27, 37, 47, 53

*Stomatoceras unipunctatipennis* Girault, 1918: 127, ♀.

*Stomatoceras unipunctatipennis unipunctatipennis* Girault; Peck 1951: 585.

*Hockeria unipunctatipennis unipunctatipennis* (Girault); Peck 1963: 849.

*Hockeria unipunctatipennis* (Girault); Burks 1979: 862.

*Stomatoceras unipunctatipennis americanensis* Girault, 1918: 127, ♀. NEW SYNONYMY

*Stomatoceras unipunctatipennis americanense* Girault; Peck 1951: 585.

*Hockeria unipunctatipennis americanensis* (Girault); Peck 1963: 849.

*Hockeria americanensis* (Girault); Burks 1979: 861.

Female diagnosis (species).—Length about 5.0 mm. Black with mandibles (except teeth), scape, pedicel, flagellomeres 1, 2, pronotum, tegulae, coxae, tarsi, femora and tibiae of fore and middle leg, hindfemora (except centrally), apex of hindtibiae, mesopleuron (except centrally), metapleuron (except ventral margin), propodeum laterally, sternites, and ovipositor sheath (except apex) orange to red.

Head rounded, as in Fig. 27. Antennae (Fig. 17) geniculate. Scutellum slightly convex. Forewing (Fig. 47) clouded from apex of submarginal vein to near apex, with a circular white setose area under stigma. Hindfemur (Fig. 37) ovoid, with projections on ventral margin. Abdomen (Fig. 7) subaccuminate. T1 dorsally polished, lightly coriaceous laterally.

The contrasting black and orange body color, relatively long head (Fig. 27), and wing pattern easily distinguish *H. unipunctatipennis*. The relationship of *H. unipunctatipennis* to other Nearctic species of *Hockeria* is questionable.

Variation (♀).—Length 2.8 to 4.6 mm. Coloration is fairly uniform; however, I have examined three females from California and the holotype of *H. americanensis* which have the thorax (except for the anterior margin of mesoscutum, axillae laterally, metanotum, propodeum, and legs) orange. Six females from Florida are completely red, the



largest specimens known (4.6 mm), and the circular spot in their forewing is slightly larger than usual.

Male description (pleisotype).—Length 3.4 mm. Black with mandibles, labrum, tegulae, and legs orange.

Head  $1\frac{1}{4}\times$  as high as wide (lateral view),  $2\times$  as wide as long (dorsal view), triangular (frontal view), with dense setigerous umbilicate punctures, polished; frontogenal carina appearing as a ridge for  $\frac{1}{2}$  its length then as a suture to ventral margin of compound eye; scrobe cavity shallowly depressed, coriaceous; antennae geniculate, flagellum filiform; pedicel as wide as long, conical; flagellum with distinct flat, silver pilose; flagellomeres 2, 3 about  $2\frac{1}{2}\times$  as long as wide, flagellomeres 1 and 4–8 about  $1\frac{1}{2}\times$  as long as wide; scape reaching dorsal margin of scrobe cavity, separated from anterior ocellus by AOD, coriaceous and setose (except for anterior margin); OL  $1\frac{1}{2}\times$  AOD, OOL  $\frac{1}{2}\times$  LOD.

Thorax sculptured like head; scutellum as wide as long, slightly convex, posterior margin rounded; mesopleural acetabulum shallow, transversely carinate, polished; outer, dorsal side of hindcoxae aciculate dorsally, polished ventrally; hindfemur  $2\times$  as long as wide, a projection on ventral margin near middle, small teeth on ventral margin from projection to apex; legs coriaceous and setose; forewing and hindwing with an orange tint, distinctly clouded, with dark setae and a darker spot under marginal vein of forewing.

Gaster slightly less than length of thorax; T1  $\frac{1}{2}$  length of abdomen (dorsal view); T1 and anterior  $\frac{1}{2}$  of T2 punctate, remainder of tergites strongly coriaceous; T1 with patch of setae dorsolaterally, and laterally along posterior margin; remainder of tergites setose throughout (except for T2 medially).

Variation ( $\delta$ ).—Length 2.5 to 3.8 mm. Body rarely completely black.

Type material.—Holotype female in USNM examined. Type locality: West Vir-

ginia, Berkeley. Pleisotype male designated as such with red label and deposited in USNM; locality data: California, Tulare Co., Ash Mtn., Kaweah powerhouse #3. Holotype female of *H. americensis* (Girault) NEW SYNONYM in USNM examined. Type locality: New Jersey, Camden Co. This specimen differs only slightly in color from typical *H. unipunctatipennis*, and is therefore designated a junior synonym.

Host.—*Neodiprion excitans* Rohwer (Hymenoptera: Tenthredinidae).

New distribution records.—CANADA: Ontario and Quebec.

Flight period.—May to October.

Floral records.—*Eriogonum gracile*, *E. virgatum*, and *Sonchus oleraceus* L.

### *Hockeria rubra* (Ashmead)

Figs. 1, 11, 21, 31, 41, 52, 53

*Stomatoceras rubra* Ashmead, 1894: 332, ♀.  
*Stomatoceras rubrum rubrum* Ashmead;  
Peck 1951: 585.

*Hockeria rubra* (Ashmead); Burks, in Stefan 1959: 304.

Female diagnosis (species).—Length about 7.0 mm. Red or orange with teeth of mandibles, teeth on ventral margin of hindfemora, metanotum laterally, propodeum ventrally, and apical perimeter of ovipositor sheath black.

Head as in Fig. 21. Antennae (Fig. 11) geniculate. Scutellum slightly convex. Forewing (Fig. 41) clouded from near apex of submarginal vein to apex of wing, appearing as two separate clouded areas due to rectangular white setose area posterior to stigma. Hindfemur (Fig. 32) ovoid, with ventral projections. Abdomen (Fig. 1) elongate, acuminate. T1 polished, faintly coriaceous laterally. Apicodorsal margin of ovipositor sheath (Fig. 1) angled.

The female of *Hockeria rubra* is most similar to *H. tenuicornis* though is distinguished by its extensive red or orange body color, ovipositor shape, and clouded pattern of the forewing.



Variation (♀).—Length 4.0 to 10.0 mm. Rarely, specimens have the metanotum, tergites ventrally, epipygidium, and T5–6 black, the head rounded (lateral view) (as in Fig. 25), and the scutellum flat. Flagellomere 4 to apex of flagellum is occasionally black. A gynandromorph was described by Halstead (1988). Five atypical (color and morphology) females were found: lab produced, La Mesa, California (3 in USNM); Broken Bow, Oklahoma (INHS); and Monterrey, Mexico (CNC). These rare variants (except for the Oklahoma specimen) were reared from *Harrisina brillians* B. & McD. or *Harrisina* sp. (Lepidoptera: Zygaenidae). I was able to identify and associate the variant specimens in the USNM as *H. rubra* only because their parents were typical *H. rubra*. The variants from Oklahoma and Mexico are identical to the USNM variants. These variant specimens differ from typical *H. rubra* in the following characters: coloration black (except for red-brown apices of fore and middle femora, base and apices of tibiae, tarsi, tergites ventrally, and sternites posteriorly); flagellomeres slightly longer than wide; scape 10× as long as wide; head round, 1½× as tall as high (lateral view); scrobe cavity deeply concave, with prominent transverse carinae; thorax flat dorsally, especially scutellum; hindfemur broadly ovoid, 1¾× as long as wide; apex of ovipositor sheath with apicodorsal margin truncate; forewing clear; and body densely setose.

Male description (pleisotype).—Length 5.0 mm. Black with labrum, mandibles, apices of tibiae, tarsi, and T1–2 ventrally red-brown.

Head 2× as high as wide (lateral view), 2½× as wide as long (dorsal view), triangular (frontal view), with setigerous umbilicate punctures, lightly coriaceous; frontogenal carina appearing as a depressed line between base of mandible and ventral margin of eye; scrobe cavity depressed, dorsally microridged, ventrally coriaceous; antennae geniculate, flagellum robustly filiform; scape

short, 7× as high as wide, not reaching anterior ocellus, lightly coriaceous; pedicel 2¼× as long as wide; flagellomeres 2× as long as wide, covered with short silver pilose; anterior ocellus at dorsal margin of scrobe cavity; OOL = LOD, OL 1⅓× AOD.

Thorax sculptured like head; scutellum aciculate, 1⅓× as long as wide, moderately convex, posterior margin with two rounded teeth; mesopleural acetabulum shallowly depressed, transversely carinate and polished; hindfemur oval, 2× as long as high, a small projection on ventral margin near middle, small teeth from projection to apex; hindcoxae with outer, dorsal side polished; legs aciculate and densely setose; wings clear, with dense dark setae; postmarginal vein ½× marginal vein.

Gaster oval (lateral view), length equal to thorax; T1 slightly less than ½ length of abdomen (dorsal view), basomedial area lightly punctate, basolaterally polished, remainder lightly coriaceous, a prominent patch of punctures and setae dorsolaterally; tergites lightly coriaceous (except for thin polished band on anterior margin of T2–5); T2–5 (except T2 medially) with a transverse band of macropunctures (Fig. 52); T6 punctate throughout; tergites setose (except for T2 medially and T1 as noted above).

Variation (♂).—Length 3.0 to 6.0 mm. Flagellum rarely red.

Type material.—Holotype female in USNM examined. Type locality: Texas. Paratypes in USNM and AMNH. Plesio-type male designated as such with red label and deposited in USNM; locality data: California, Tulare Co., Ash Mtn., Kaweah powerhouse #3.

New distribution records.—CANADA: British Columbia; U.S.A: Washington, Idaho, Nevada, Utah, Colorado, New Mexico, Georgia, and North Carolina; MEXICO: Chihuahua, and Monterrey.

Flight period.—May to October.

Host.—*Harrisina brillians* (Lepidoptera: Zygaenidae).

Floral records.—*Acacia Greggii* Gray,

*Chrysothamnus nauseosus* (Pall.), *Eriogonum virgatum* Benth., *Gossypium hirsutum*, *Stanleya pinnata* (Pursh), *Yucca elata* (Engelm.), *Eriogonum*, and *Prosopis*.

Comments.—*Harrisina brillians* (Western Grapeleaf Skeletonizer) larvae defoliate grapes (*Vitis* spp.) and two ornamental vines, Virginia Creeper (*Parthenocissus tricuspidata* (Sieb. & Zucc.)) and Boston Ivy (*P. quinquefolia* (L.)) in the southwestern United States and Mexico (Stern 1981). In 1952 and 1953, low numbers (45 and 35, respectively) of *H. rubra* were released into California (San Diego area) to control the skeletonizer (Clausen 1955; 1956), despite *H. rubra* being native to California.

From 1977 to 1983 Biological Control Services Program personnel, CDFA (including author 1981–1983) reared approximately 200,000 skeletonizer larvae and/or pupae from several locations in California, but no specimens of *H. rubra* were reared. This indicates that *H. rubra* has little impact upon *Harrisina brillians* populations in California.

### *Hockeria tenuicornis* (Girault)

Figs. 2, 12, 22, 32, 42, 53

*Stomatoceras tenuicornis* Girault, 1918: 127, ♀.

*Stomatoceras tenuicorne* Girault; Peck 1951: 585.

*Hockeria tenuicornis* (Girault); Peck 1963: 849.

Female diagnosis (species).—Length about 7.0 mm. Orange with teeth of mandibles, innerocular area, mesosternum, pronotum anteriorly, mesoscutum medially, lateral corner of axillae, scutellum medially, metanotum, propodeum, hindtibiae anteriorly, apex of ovipositor sheath, abdomen (except ventrally), and hindfemora centrally black.

Head as in Fig. 22. Antennae (Fig. 12) geniculate. Scutellum slightly convex. Forewing (Fig. 42) like *rubra* except white setose area elliptical. Hindfemur (Fig. 32) ovoid,

with ventral projections. Abdomen (Fig. 2) elongate, acuminate. T1 polished, coriaceous laterally and dorsoposteriorly. Apicodorsal margin of ovipositor sheath (Fig. 2) evenly rounded.

The female of *Hockeria tenuicornis* is most similar to *H. rubra* though is distinguished by its black and orange body color, ovipositor shape, and clouded pattern of the forewing.

Variation (♀).—Length 3.5 to 7.0 mm. Dark specimens with scape, flagellomere 2 to apex, entire thorax dorsally, occiput, scrobe cavity, hindtibia, and hindfemur black; light colored specimens with pronotum, scutellum, T1–2 laterally, and hindfemur orange.

Male description (pleisotype).—Length 4.3 mm. Black with mandibles, labrum, trochanters, apices of femora, outside of middle femora, apices of tibiae, tarsi, and T1–2 ventrally orange.

Like *H. rubra* male except for the following characters: body coloration and length, frontogenal carina a ridge extending  $\frac{1}{2}$  way to ventral margin of compound eye; scutellum only slightly longer than wide, posterior margin without teeth, evenly rounded; T1 densely punctate medially in basal  $\frac{2}{3}$ , polished only near base, without prominent punctures dorsolaterally; tergites densely coriaceous (except for aciculate band on anterior margin of T2–5); band of macropunctures on T2–5 faint; punctures on T6 obscured by coriaceous sculpture; outer, dorsal side of hindcoxae mostly aciculate.

Variation (♂).—Length 3.0 to 5.0 mm. Flagellum rarely red.

Type material.—Holotype female in USNM examined. Type locality: Arizona, Santa Rita Mtns. Pleisotype male designated as such with red label and deposited in USNM; locality data: California, Tulare Co., Ash Mtn., Kaweah powerhouse #3.

New distribution records.—U.S.A.: Oregon and Utah; MEXICO: Tlaxcala.

Flight Period.—May to October.

Host.—*Rhyacionia zozana* (Kearfott)

(Lepidoptera: Tortricidae) larvae and possibly pupae (Halstead and Niwa 1987).

Floral records.—*Adenostoma fasciculatum* H. & A., *Eriogonum fasciculatum* Benth., *E. gracile* Benth., *E. inflatum* Torr. & Frem., *Astragalus lentiginosus* Dougl., *Euphorbia*, and *Salvia*.

***Hockeria hainesi* Halstead,**

**NEW SPECIES**

Figs. 3, 13, 23, 33, 43, 53

Holotype female.—Length 2.8 mm. Orange with flagellum (except for flagellomere 1), ocellar area, teeth of mandibles, mesosternum, anterior and posterior margins of scutum, submedial corner of scapula, axillae, metanotum, scutellum laterally, propodeum basally, ventral margin of metapleuron, T1 sublaterally, T3–6, T2 dorsally, epipygidium, ovipositor sheath, basal ½ of tibiae, tarsal claws, and teeth on ventral margin of hindfemur black; T1 (except sublaterally), T2 laterally, scutum (except for anterior and posterior margins), and scutellum (except laterally) dark orange-brown. Setae and pubescence silver.

Head (Fig. 23) rounded (lateral view), with shallow umbilicate setigerous punctures, polished; OOL ½ LOD, OL < AOD; antennae (Fig. 13) geniculate; interantennal lobe rounded; frons with anterior margin (lateral view) sloped; scrobe cavity slightly depressed, coriaceous; gena with shallow punctures; innerorbital ridge absent.

Thorax sculptured like head, flat dorsally; scutellum slightly convex, posterior margin with two broad teeth; mesopleural acetabulum with strong transverse carinae, sculpture rugose; hindfemur (Fig. 33) ovoid, about 2× as long as high, ventral margin with 2 projections and 21 small teeth; forewing (Fig. 43) with apex reaching to near apex of abdomen, with two clouded areas; hindwing clear.

Gaster (Fig. 3) shorter than head and thorax together, elongate, apex pointed, dorsal margin flat (lateral view); tergites strongly coriaceous (except for smooth band

along posterior margins and basal ½ of T1); ovipositor sheath with apicodorsal margin evenly rounded; tergites (T1 laterally and T2 except medially) setose; ovipositor projecting posterior of abdomen.

Variation (♀).—Length 2.5 to 2.8 mm. Two paratypes with occiput medially, posterior of ocellar area orange-brown.

Allotype male.—Length 3.0 mm. Black with mandibles, apex of femora and tibiae, and tarsi orange; pedicel and flagellum brown.

Like *H. micra* male except for color, propodeal, and mesopleural characters presented in the key (couplet 14).

Variation (♂).—Known only from allotype.

Type material.—Holotype ♀ (CAS No. 15243), U.S.A., CALIFORNIA, Tulare Co., Ash Mtn., Kaweah powerhouse #3, IX-8-1983, from hydroelectric flume, J. A. Halstead, R. D. Haines, D. J. Burdick. Allotype ♂ (CAS No. 15243a), ARIZONA, Cochise Co., Chiricahua Mts., S.W.R.S. 5400', VII-31-1980, V. Roth. Paratypes: 6 ♀ paratypes with same data as holotype but 5 collected: X-1-1982, VII-3-1983, IX-2, 15-1984, VII-12-1986 (CAS, USNM, JAH, RDH). ARIZONA, 2 ♀, Cochise Co., Chiricahua Mts., S.W.R.S. 5400', VI-29-1980, V-4-7-1980, V. Roth (CNC).

Host.—Unknown.

Comments.—The female of this species is most similar to *H. tenuicornis*. *Hockeria hainesi* resembles a minute specimen of *H. tenuicornis* though is distinguished by its rounded head and small body size.

Etymology.—The specific name, a noun in the genitive case from a modern personal name, is in honor of R. D. Haines—a friend who collected most of the specimens.

***Hockeria brevipennis* Halstead,**

**NEW SPECIES**

Figs. 4, 14, 24, 34, 44, 53

Holotype female.—Length 2.6 mm. Orange with flagellum (except flagellomere 1), teeth of mandibles, apex of ovipositor



sheath, teeth on ventral margin of hindfemur, and tarsal claws black; marginal and postmarginal veins of forewing, apex of submarginal vein of hindwing, and T3-6 (except ventrally) orange-brown. Setae and pubescence silver.

Head (Fig. 24) rounded (lateral view), with shallow umbilicate setigerous punctures, individual punctures difficult to distinguish, polished, setation sparse and short; OOL  $\frac{1}{3}$  LOD, OL = AOD; antennae (Fig. 14) geniculate; interantennal lobe rounded; frons with anterior margin (lateral view) sloped; scrobe cavity slightly depressed, faintly coriaceous; gena glabrous; innerorbital ridge absent.

Thorax sculptured like head, flat dorsally; scutellum slightly convex, posterior margin rounded, with 2 vague rounded teeth; mesopleural acetabulum weakly depressed, coriaceous, with a few vague transverse carinae; hindfemur (Fig. 34) ovoid, about 2× as long as high, ventral margin with 2 projections and 21 small teeth; forewing (Fig. 44) short, apex reaching to middle of abdomen, with two clouded areas; hindwing clear.

Gaster (Fig. 4) slightly longer than head and thorax together, subelongate, dorsal margin flat (lateral view), apex subacuminate; T1 polished dorsally, coriaceous laterally, basolaterally with a patch of setae; T2-6 coriaceous, sparsely setose, setae more prominent sublaterally; ovipositor projecting slightly posterior of abdomen.

Variation (♀).—Length 2.6 to 2.8 mm. One paratype with metanotum dark orange-brown. Two paratypes with T3-6 completely orange.

Allotype male.—Length 2.3 mm. Orange with head, thorax (dorsally), and scape orange-brown.

Like *H. bicolor* male except for the following: OL  $2\frac{1}{4}$ × AOD; scrobe cavity coriaceous; flagellomere 1 2× as long as wide; head and thorax with shallow, vaguely defined punctures, rugose, matte; scutellum with posterior margin rounded; mesopleu-

ral acetabulum with a few vague, transverse carinae, rugose.

Variation (♂).—Known only from allotype.

Type material.—Holotype ♀ (CAS No. 15242) and Allotype (CAS No. 15242a), U.S.A., CALIFORNIA, Riverside Co., Menifee Valley (hills on west end), 33°39'N, 117°13'W, 1800 ft. elevation, pan trap under *Eriogonum gracile*, X-17-22-1981, J. D. Pinto. Paratypes: 4 ♀ with same data as holotype except collected IX-16-22-1981 in pan trap under *Eriogonum*, and VIII-18-29-1982 in pan trap under *E. fasciculatum* (CAS, UCR, USNM, JAH).

Host.—Unknown.

Comments.—The female of this species is most similar to *H. micra* n. sp. but, *brevipennis*'s orange body color and T1 polished dorsally are distinguishing.

Etymology.—The specific name, a Latin compound word, means short wings—calling attention to the wings of this species.

### *Hockeria micra* Halstead,

#### NEW SPECIES

Figs. 5, 15, 25, 35, 45, 53

Holotype female.—Length 2.5 mm. Black with basal  $\frac{1}{3}$  of scape, annellus, flagellomere 1, mandibles (except teeth), palps, middle coxae, apical  $\frac{1}{4}$  and base of hindcoxae, trochanters, apex and base of femora, apex of tibiae, tarsi (except claws), tegulae, hypopygidium, and petiole ventrally orange. Setae and pubescence silver.

Head (Fig. 25) rounded (lateral view), with shallow umbilicate setigerous punctures, polished; OOL  $\frac{1}{2}$  LOD, OL < AOD; antennae (Fig. 15) geniculate; interantennal lobe rounded; frons with anterior margin (lateral view) sloped; scrobe cavity slightly depressed, coriaceous; gena rugose; innerorbital ridge absent.

Thorax sculptured like head, flat dorsally; scutellum slightly convex, posterior margin with two broad teeth; mesopleural acetabulum with vague transverse carinae, coriaceous; hindfemur (Fig. 35) ovoid, about 2×

as long as high, ventral margin with 2 projections and 21 small teeth; forewing (Fig. 45) with apex extending to apex of abdomen, with a single clouded area under marginal vein; hindwing clear.

Gaster (Fig. 5) as long as head and thorax together, subaccuminate, apex pointed, dorsal margin flat (lateral view); ovipositor sheath with apicodorsal margin angled (squared); tergites strongly coriaceous (except for smooth band along posterior margins and basal  $\frac{1}{2}$  of T1); tergites (T1 laterally and T2 except medially) setose; ovipositor projecting posterior of abdomen.

Variation ( $\varnothing$ ).—Length 2.0 to 2.5 mm. Commonly, orange areas are brown or black. Commonly, scape orange basally and brown apically, rarely entire scape black. Flagellomere 1 rarely brown or black. Flagellomere 2 occasionally orange. One paratype with ventral  $\frac{1}{2}$  of T1–2 orange-brown. Two paratypes with fore and middle coxae orange. Four paratypes with tegula black. Six paratypes (Maryland and Florida, Lee Co.) with two clouded areas in forewing. Basal clouded area larger and darker than in holotype; distal area small and oval, located in middle of wing near apex. One paratype (Ivanpah) with forewing clear.

Allotype male.—Length 2.1 mm. Black with mandibles, apices of femora and tibiae, and tarsi orange.

Like *H. burksi* n. sp. male except for the following: head  $1\frac{1}{3}\times$  as high as wide (lateral view); flagellomeres 3–8  $1\frac{1}{3}\times$  as long as wide; scrobe cavity coriaceous; mesopleural acetabulum with a few vague transverse carinae, punctate; posterior margin of scutellum appearing rounded, with two vague broad teeth; forewing with spot under marginal vein vague; postmarginal vein  $1\frac{1}{4}\times$  marginal vein. Propodeum in medial area a reticulation of oval carinae. Anterior area of mesopleuron smooth and polished, punctate only in basal  $\frac{1}{3}$ .

Variation ( $\delta$ ).—Length 1.8 to 2.3 mm. Forewing rarely hyaline.

Type material.—Holotype  $\varnothing$  (CAS No.

15244) and Allotype  $\delta$  (CAS No. 15244a), U.S.A., CALIFORNIA, Tulare Co., Ash Mtn., Kaweah powerhouse #3, X-5-1982, from hydroelectric flume, J. A. Halstead, D. J. Burdick, R. D. Haines. Paratypes: CALIFORNIA, 34  $\varnothing$  paratypes with same data as holotype except collected VI–IX 1982 to 1986 (CAS, USNM, CIS, UCR, AMNH, UCD, CNC, JAH, RDH, HAH). 1  $\varnothing$ , Kern Co., Shafter, VIII-2-1955, J. Powell (CIS). 1  $\varnothing$ , Alameda Co., Livermore 10 mi E., Tesla Rd., VIII-9-1959, G. I. Stange (CAS). 1  $\varnothing$ , Stanislaus Co., Del Puerto Cyn., VIII-7-1978, N. J. Smith (UCD). 1  $\varnothing$ , San Bernardino Co., Ivanpah, 12 mi SE., V-1-1956, P. D. Hurd (CIS). 1  $\varnothing$ , Marin Co., Novato, X-13-1968, in swimming pool, I. Baker (CDFA). 31  $\varnothing$ , Fresno Co., Panoche Road at San Benito Co. line, VIII-11-1982, IX-9-1982, VIII-24-1983, on *Euphorbia* mats, J. A. Halstead, N. J. Smith (CAS, USNM, FCDA). 6  $\varnothing$ , Riverside Co., Menifee Valley (hills on west end), 33°39'N, 117°13'W, 1800' elevation, V-24–VI-2-1982, IX-16–21-1981, VI-13–18-1981, pan traps under *Adenostoma fasciculatum* and *Eriogonum* (UCR); 5  $\varnothing$ , Indio, T5S, R7E, S14, XI-3-1983, insectary reared from *Coleophora klimeschiella* on *Salsola iberica*, R. D. Goeden and D. W. Ricker (UCR). MONTANA, 1  $\varnothing$ , Missoula, VIII-7-1950, B. Malkin (CAS). COLORADO, 1  $\varnothing$ , Gunnison Co., Black Mesa, 10.7 mi W. Sapinero, VIII-19-1966, T. C. Emmel (LCM). 1  $\varnothing$ , Dolores Co., 21 mi NE. Delores, Cottonwood Spring (Montezuma Co.), 7800', VII-23-1976, N. L. Herman (AMNH). ARIZONA, 3  $\varnothing$ , Cochise Co., 5 mi NNW. Portal, San Simon Road, 4600', 31°59'N, 109°10'W, V-18-1985, flowers of *Chamaesyce*, H. A. Hespeneheide (HAH); 1  $\varnothing$ , 2 mi ESE. Portal, VI-7-1979, at mesquite, H. A. Hespeneheide (HAH). NEW MEXICO, 1  $\varnothing$ , Hidalgo Co., 6 mi N. Rodeo, Antelope Corral, 4040', 31°55–56'N, 109°00–01'W, V-22-1985, H. A. Hespeneheide (HAH). MISSISSIPPI, 1  $\varnothing$ , Agr. Coll. Miss. VIII-31-1911, Pecan, E. C. Crockett (MSU). MARYLAND, 2  $\varnothing$ , Worc. Co., Snow



Hill, IX-13-1973, *Rhyacionia frustrana* (USNM). FLORIDA, 1 ♀, Highlands Co., Archbold Biol. Sta., IV-22-25-1982, L. L. Lampert, Jr. and H. V. Weems, Jr., insect flight trap (FDA). 4 ♀, Lee Co., Lehigh Acres, IV-6-1988, exit cocoons of *Phormoestes palmettovora* Heppner, VII-2-14-1988, J. R. Brushwein (USNM, FDA).

Nontype material.—CALIFORNIA, 3 ♂, Riverside Co., Riverside, on *Lotus*, *Eriogonum auriculatum*, *E. gracile*, X-15-1925, Timberlake (UCR); 1 ♂, 18 mi W. Blythe, III-31-1978, N. J. Smith (UCD); 1 ♂, San Timoteo Cyn., Malaise trap, 10 am to 3 pm, IX-9-1974, M. Wasbauer and R. McMastear (CDFA); 5 ♂, Indio—as above. 1 ♂, San Bernardino Co., 5 mi N. Renoville, Salt Crk., *Atriplex hymenelytra*, IV-17-1974, F. G. Andrews (CDFA); 1 ♂, Mill Crk., *Eriogonum gracile*, X-1-1951, Timberlake (UCR); 1 ♂, Needles, V-3-1964, G. E. Bohart (USU); 1 ♂, San Lucas, V-20-1935, Timberlake; 1 ♂, 12 mi SE. Ivanpah—as above. 2 ♂, Marin Co., Novata—as above. 1 ♂, San Diego Co., Warner Sprgs., Agua Calicate Crk., 3100', VIII-23/25-1980, Malaise trap, M. Wasbauer and P. Adams (CDFA). 1 ♂, Placer Co., 4 mi S. Rocklin, V-26-1979, Malaise trap, M. Wasbauer and P. Adams (CDFA). 1 ♂, Stanislaus Co., Del Puerto Cyn.—as above. 1 ♂, Humboldt Co., Redwood Crk., Redwood Vly., N. of Hyw. 299, 650', VIII-10-1968, H. B. Leech (CAS). 1 ♂, Kern Co., Shafter—as above. 1 ♂, Fresno Co., S. of Coalinga, Warthan Cyn. Rd., S36, T20S, R12E, I-19-1981, N. J. Smith (FCA-CO). 30 ♂, Tulare Co., Ash Mtn. Kaweah powerhouse #3—as above (CAS, RDH, JAH). 1 ♂, Nevada Co., Boca, VII-23-1970, E. E. Grissell, Great Basin Desert (FDA). ARIZONA, 1 ♂, 5 mi W. Manicopa Aguila, VI-22-1971, G. Bohart and P. Torchio (USU). UTAH, 1 ♂, St. George, VI-13-1930, E. Davis, *Gutierrezia lucida* (USNM). TEXAS, 1 ♂, Uvalde Co., 3 mi NW. Uvalde, Speir Rch., V-4-1977, T. Eichlin and M. Wasbauer (CDFA). NEW YORK, 2 ♂, New

York (AMNH). FLORIDA, 2 ♂, Lee Co.—as above.

Host.—*Rhyacionia frustrana* (Lepidoptera: Tortricidae); *Coleophora klimeschiella* Toll (Lepidoptera: Coleophoridae) (Goeden et al. 1987); and *Phormoestes palmettovora* (Lepidoptera: Choreutidae) (Brushwein, in prep.). *Rhyacionia* are pests of pine trees (*Pinus* spp.). *Coleophora klimeschiella*, a biological control agent against Russian thistle (*Salsola australis* R. Brown), was released into the United States (California) in 1977 (Goeden et al. 1987).

Comments.—The female of this species is most similar to *H. burksi* n. sp. but, *micra* is smaller in length and the ovipositor has the dorsal margin angled.

Etymology.—The specific name, a Latinized Greek adjective, means small—referring to the size of this species.

### *Hockeria burksi* Halstead,

#### NEW SPECIES

Figs. 6, 16, 26, 36, 46, 53

Holotype female.—Length 3.8 mm. Black with base of scape, tegulae, coxae (except basal  $\frac{1}{3}$  of hindcoxae), trochanters, fore and middle femora basally, hindfemur (except base and dorsal edge), fore and middle tibiae apically, hindtibiae, submarginal vein of forewing, venation of hindwing, tarsi (except claws), and ovipositor sheath orange; labrum, mandibles (except teeth), hypopygidium, annellus, flagellomere 1, palps, and remainder of forewing venation orange-brown. Setae and pubescence silver.

Head (Fig. 26) rounded (lateral view), polished, with dense umbilicate setigerous punctures; OOL  $\frac{1}{2}$  LOD, OL < AOD; antennae (Fig. 16) filiform; interantennal lobe rounded; frons with anterior margin (lateral view) sloped; scrobe cavity slightly depressed, coriaceous; innerorbital ridge absent.

Thorax sculptured like head; scutellum low, gently convex, posterior margin with two broad teeth; mesopleural acetabulum with strong transverse carinae, coriaceous;

hindfemur (Fig. 36) ovoid, about  $2\times$  as long as high, ventral margin with 2 projections and 21 small teeth; forewing (Fig. 46) with apex reaching to base of epipygidium, with a single clouded area under marginal vein; hindwing clear.

Gaster (Fig. 6) shorter than head and thorax together, elongate, apex pointed, dorsal margin flat (lateral view); tergites strongly coriaceous (except for smooth band along posterior margins and basal  $\frac{1}{2}$  of T1); ovipositor sheath with apicodorsal margin evenly rounded; tergites (T1 laterally and T2 except medially) setose; ovipositor projecting posterior of abdomen.

Variation ( $\varnothing$ ).—Length 3.5 to 3.9 mm. Black or orange-brown areas in holotype commonly brown or orange, respectively. One paratype (Riverside) with T1–5 ventrally, scape, pedicel, flagellomeres 1–2, sternites, hypopygidium, and legs orange. One paratype (San Diego Co.) with two clouded areas in forewing: under marginal vein and in middle near apex.

Allotype male.—Length 3.5 mm. Black with tibiae and tarsi apically orange-brown.

Head  $1\frac{1}{4}\times$  as high as wide (lateral view),  $2\frac{1}{3}\times$  as long as wide (dorsal view), triangular (frontal view), with umbilicate setigerous punctures, polished; frontogenal carina a prominent ridge in ventral  $\frac{1}{2}$ , remainder reduced, extending from base of mandible to ventral margin of compound eye; scrobe cavity shallowly depressed, ventrally coriaceous, dorsally transversely microridged; antennae filiform; scape reaching dorsal margin of scrobe cavity, separated from anterior ocellus by AOD, coriaceous and setose except for anterior margin; pedicel as wide as long, conical; flagellomeres 1 and 2  $2\frac{1}{2}\times$  as long as wide, others  $2\frac{1}{2}\times$  as long as wide; OL  $1\times$  AOD, OOL  $\frac{1}{2}\times$  LOD.

Thorax sculptured like head; mesopleural acetabulum shallow, transversely carinate, polished; scutellum as wide as long, moderately convex, anterior margin with two broad teeth; axillae and pronotum coria-

ceous laterally, remainder of thorax faintly aciculate; outer, dorsal side of hindcoxae coriaceous; hindfemur oval,  $2\times$  as long as high, ventral margin evenly rounded, without a large projection or tooth, small teeth on ventral margin from middle to apex; legs coriaceous and setose; forewing with a clouded spot under marginal vein, with dark setae; postmarginal vein equal to marginal vein.

Gaster oval (lateral view), equal in length to head and thorax together; T1 about  $\frac{1}{2}\times$  gaster (dorsal view), punctate, a thin coriaceous band along posterior margin, densely coriaceous laterally, with a patch of setae dorsolaterally; T2 punctate medially; other tergites coriaceous (except for polished band along anterior margin of T2–4), setose (except T2 medially); indications of faint transverse punctures on T4–5.

Variation ( $\delta$ ).—Length 3.0 to 3.7 mm.

Type Material.—Holotype  $\varnothing$  (CAS No. 15245) and Allotype  $\delta$  (CAS No. 15245a), U.S.A.: CALIFORNIA, Tulare Co., Ash Mtn., Kaweah powerhouse #3, VII-3-1982, from a hydroelectric flume, R. D. Haines, D. J. Burdick, J. A. Halstead. Paratypes: CALIFORNIA, 18  $\varnothing$  paratypes with same data as holotype except collected: VII-3-1982, VIII-8, 15-1982, X-1-1982, VII-3, 10, 24-1983, X-8-1983, VI-10-1984, VI-8-1985, VI-1986, one specimen W. F. Peregrin collector (USNM, CNC, AMNH, JAH, RDH). 1  $\varnothing$ , Tulare Co., Three Rivers, VII-18-1986, Apple maggot trap, R. D. Haines (RDH). 1  $\varnothing$ , Riverside Co., San Timoteo Cyn., Malaise trap, 10a-3p, IX-9-1974, M. Wasbauer, R. McMaster (CDFA); 1  $\varnothing$ , Riverside, VII-27-1921, *Euphorbia albomarginata*, Timberlake (UCR); 2  $\varnothing$ , Riverside, VI-13-1978, J. C. Hall (UCR); 2  $\varnothing$ , Meniffee Valley (hills on west end),  $33^{\circ}39'N$ ,  $117^{\circ}13'W$ , 1800' elevation, IX-16-21-1981, pan traps under *Eriogonum* (UCR). 1  $\varnothing$ , Stanislasus Co., Del Puerto Cyn., Frank Raines Park, 335 m, V-16-1970, P. H. Arnaud, Jr. (CAS). 1  $\varnothing$ , San Diego Co., San Diego, III-29-1891, F. E. Blaisdell (CAS).

GEORGIA, 1 ♀, Clarke Co., Horseshoe Bend, Athens, Univ. of Georgia Ecol. Inst., VI-26-1967 (UOG).

Nontype material.—CALIFORNIA, 2 ♂, Riverside Co., Riverside, VII-10, 13-1978, J. C. Hall (UCR); 1 ♂, Pinyon Flat Public Camp, 1463 m, VI-30-1968, P. H. Arnaud, Jr. (CAS). 1 ♂, San Bernardino Co., 11 mi N. Goffs, Lanfair Rd., V-25-1977, J. D. Pinto (UCR); 1 ♂, 3 mi W. Lucerne Vly., V-5-1975, J. D. Pinto (UCR). 30 ♂, Tulare Co., Ash Mtn, Kaweah powerhouse #3 (CAS, RDH, JAH). 1 ♀, 2 ♂, Kern Co., China Lake Weapons Center, Lark Seep Lagoon, VI-6-8-1986, D. J. Burdick (CSUF). ARIZONA, 1 ♂, Santa Cruz Co., Patagonia, VII-4-1961, L. R. Breimeier (LCM). MEXICO, SONORA, 3 ♂, San Larios, IX-3-1970, on *Euphorbia*, R. M. Bohart (USU).

Host.—Unknown.

Comments.—The female of this species is most similar to *H. micra* but, *burksi* is longer in length and the ovipositor has the dorsal margin rounded.

Etymology.—The specific name, a noun in the genitive case from a modern personal name, is in honor of Barnard D. Burks (former Chalcidologist with the USDA c/o USNM) who is one of the pioneering researchers in this field and who graciously donated to the Society to fund this publication.

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